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GASB STATEMENT NO. 68 REPORT

FOR THE

MISSOURI STATE EMPLOYEES'

RETIREMENT SYSTEM

REISSUED

MEASUREMENT DATE: JUNE 30, 2017





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

February 7, 2018

Board of Trustees
Missouri State Employee' Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Board Members:

Presented in this report is information to assist the Missouri State Employees' Retirement System in providing information required under the Governmental Accounting Standards Board (GASB) Statement No. 68 to participating employers. GASB Statement No. 68 establishes accounting and financial reporting requirements for governmental employers who provide pension benefits to their employees through a trust. This report has been prepared as of June 30, 2017, the Measurement Date. The calculations in this report have been made on a basis that is consistent with our understanding of this accounting standard (GASB 68).

The annual actuarial valuation used as a basis for much of the information presented in this report was performed as of June 30, 2017. The valuation was based upon data, furnished by the System's staff, concerning active, inactive and retired members along with pertinent financial information. This information was reviewed for completeness and internal consistency, but was not audited by us. The valuation results depend on the integrity of the data. If any of the information is inaccurate or incomplete, our results may be different and our calculations may need to be revised. Please see the actuarial valuation for additional details on the funding requirements for the System including actuarial assumptions and methods and the funding policy.

To the best of our knowledge, the information contained in this report is complete and accurate. The calculations were performed by qualified actuaries according to generally accepted actuarial principles and practices, as well as in conformity with Actuarial Standards of Practice issued by the Actuarial Standards Board. The calculations are based on the current provisions of the System, and on actuarial assumptions that are internally consistent and individually reasonable based on the actual experience of the System. In addition, the calculations were completed in compliance with applicable law and, in our opinion, meet the requirements of GASB 68.



Board of Trustees
February 7, 2018
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These results are only for financial reporting and may not be appropriate for funding purposes or other types of analysis. Calculations for purposes other than satisfying the requirements of GASB 68 may produce significantly different results. Future actuarial results may differ significantly from the current results presented in this report due to such factors as changes in plan experience or changes in economic or demographic assumptions.

We, Patrice A. Beckham, FSA and Bryan K. Hoge, FSA, are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in this report or to provide explanations or further details as may be appropriate.

Respectfully submitted,

A handwritten signature in blue ink that reads 'Patrice Beckham' in a cursive script.

Patrice Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink that reads 'Bryan K. Hoge' in a cursive script.

Bryan K. Hoge, FSA, EA, FCA, MAAA
Senior Actuary



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GASB STATEMENT NO. 68

MISSOURI STATE EMPLOYEES' RETIREMENT SYSTEM

SECTION I - SUMMARY OF PRINCIPAL RESULTS

Valuation Date (VD):	June 30, 2017
Prior Measurement Date:	June 30, 2016
Measurement Date (MD):	June 30, 2017
Membership Data:	
Retirees and Beneficiaries	46,560
Inactive Vested Members	20,605
Inactive Nonvested Members	3,899
Active Employees	<u>48,910</u>
Total	119,974
Single Equivalent Interest Rate (SEIR):	
Long-Term Expected Rate of Return	7.50%
Municipal Bond Index Rate at Prior Measurement Date	2.85%
Municipal Bond Index Rate at Measurement Date	3.56%
Year in which Fiduciary Net Position is Projected to be Depleted	N/A
Single Equivalent Interest Rate at Prior Measurement Date	7.65%
Single Equivalent Interest Rate at Measurement Date	7.50%
Net Pension Liability:	
Total Pension Liability (TPL)	\$13,152,273,895
Fiduciary Net Position (FNP)	<u>7,945,358,298</u>
Net Pension Liability (NPL = TPL – FNP)	\$5,206,915,597
FNP as a percentage of TPL	60.41%
Collective Pension Expense:	\$884,134,323
Collective Deferred Outflows of Resources:	\$1,536,745,880
Collective Deferred Inflows of Resources:	\$273,835,740



SECTION II – INTRODUCTION

The Governmental Accounting Standards Board issued Statement No. 68 (GASB 68), “*Accounting and Financial Reporting for Pensions*” in June 2012. GASB 68’s effective date for employers is the first fiscal year beginning after June 15, 2014.

This report, prepared as of June 30, 2017 (the Measurement Date), presents information to assist the Missouri State Employees’ Retirement System in providing the required information under GASB 68 to participating employers. Employers can use the information in this report for fiscal years ending on or before June 30, 2018. The Missouri State Employees’ Retirement System is a cost-sharing multiple employer plan, so the Net Pension Liability and Pension Expense are allocated among the participating employers. Those amounts, which are needed for the employers’ financial statements, are provided in Appendix D.

Much of the material provided in this report, including the Net Pension Liability, is based on the results of the GASB 67 report for the Missouri State Employees’ Retirement System, which was issued October 10, 2017. See the GASB 67 report for more information on the member data, actuarial assumptions and methods used in developing the Net Pension Liability and other GASB 67 results.

GASB 68 requires the inclusion of a proportionate share, as appropriate, of the Collective Net Pension Liability (NPL) on the participating employer’s Statement of Net Position and a determination and proportionate share, as appropriate, of a Collective Pension Expense (PE) in the Notes to the Financial Statements that may bear little relationship to the employer’s funding requirements. In fact, it is possible in some years for the NPL to be an asset or the PE to be an income item. The NPL is set equal to the Total Pension Liability (TPL) minus the Fiduciary Net Position (FNP). The benefit provisions recognized in the calculation of the TPL are summarized in Appendix B.

PE includes amounts for Service Cost (the Normal Cost under Entry Age Normal (EAN) for the year), interest on the TPL, employee contributions, administrative expenses, other cash flows during the year, recognition of increases/decreases in the TPL due to changes in the benefit structure, actual versus expected experience, and actuarial assumption changes, and recognition of investment gains/losses. The actual experience and assumption change impacts are recognized over the average expected remaining service life of the System membership as of the beginning of the measurement period, while investment gains/losses are recognized equally over five years. The development of the PE is shown in Section III.

The unrecognized portions of each year’s experience, assumption changes and investment gains/losses are used to develop the Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources, the proportionate share of which, as appropriate, also must be included on the participating employer’s Statement of Net Position.

Among the items needed for the TPL calculation is a discount rate, as defined by GASB, or a Single Equivalent Interest Rate (SEIR). To determine the SEIR, the FNP must be projected into the future for as long as there are anticipated benefits payable under the plan provisions applicable to the membership and



beneficiaries of the System on the Measurement Date. If the FNP is not projected to be depleted at any point in the future, the long-term expected rate of return on plan investments expected to be used to finance the benefit payments may be used as the SEIR.

If, however, the FNP is projected to be depleted at a future measurement date, the SEIR is determined as the single rate that will generate a present value of benefit payments equal to the sum of the present value determined by discounting all projected benefit payments through the date of depletion by the long-term expected rate of return, and the present value determined by discounting those benefits after the date of depletion by a 20-year tax-exempt municipal bond (rating AA/Aa or higher) rate. The rate used, if necessary, for this purpose is the monthly average of the Bond Buyers General Obligation 20-year Municipal Bond Index Rate (formerly published monthly by the Board of Governors of the Federal Reserve System).

Our calculations indicate that the FNP is not projected to be depleted, so the Municipal Bond Index Rate is not used in the determination of the SEIR. The SEIR for the Measurement Date is 7.50%, the long-term assumed rate of return on investments. The SEIR for the Prior Measurement Date was 7.65%.

The FNP projections are based on the System's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67 and 68. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the System will actually run out of money, the financial condition of the System, or the System's ability to make benefit payments in future years.

The sections that follow provide the results of all the required calculations, presented in the order set out in GASB 68 for note disclosure and Required Supplementary Information (RSI).



SECTION III – PENSION EXPENSE

As noted earlier, the Collective Pension Expense (PE) consists of a number of different items. GASB 68 refers to the first as Service Cost, which is the Normal Cost using the Entry Age Normal (EAN) actuarial funding method. The second item is interest on the TPL at 7.65%, the SEIR in effect as of the Prior Measurement Date.

The next three items refer to any changes that occurred in the TPL due to:

- benefit changes,
- actual versus expected experience, or
- changes in actuarial assumptions or other inputs.

Benefit changes, which are reflected immediately in PE, will increase PE if there is a benefit improvement for existing System members, or decrease PE if there is a benefit reduction. For the year ended June 30, 2017, there was one benefit change to be recognized. Senate Bill 62 made several changes to the MSEP 2011 benefit provisions, which are detailed in Section V of this report. The net impact of all of the changes was a decrease in the TPL of \$1,696,059.

The next item to be recognized is the portion of current year change in the TPL due to actual versus expected System experience for the year. The portion to recognize in the current year is determined by spreading the total change over the average expected remaining service life of the entire System membership at the beginning of the measurement period. The average expected remaining service life of active members is the average number of years the active members are expected to remain in covered employment. At the beginning of the measurement period this number is 8.714 years. The average expected remaining service life of the inactive members is zero. Therefore, the recognition period is the weighted average of these two amounts, or 3.650 years.

The last item under changes in TPL is changes in actuarial assumptions or other inputs. There was one change in the actuarial assumptions or other inputs since the Prior Measurement Date. This change was a decrease in the long-term rate of return from 7.65% to 7.50%. This change will be recognized over the average expected remaining service life of the entire System membership, using the same approach that applied to experience gains and losses, as described earlier.

Employee contributions for the year and projected earnings on the FNP (using the long-term expected rate of return) are subtracted from the amount determined thus far. One-fifth of the current-period difference between projected and actual earnings on the FNP is recognized in the PE.

The current year portions of previously determined experience, assumption changes and earnings amounts, recognized as Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources are included next. Collective Deferred Outflows of Resources are added to the PE while Collective Deferred Inflows of Resources are subtracted from the PE. Finally, administrative expenses and other miscellaneous items are included.

The calculation of the Collective PE for the year ended June 30, 2017 is shown in the following table.



**Collective Pension Expense
For the Year Ended**

June 30, 2017	
Service Cost at end of year	\$152,766,134
Interest on the Total Pension Liability	945,654,398
Benefit term changes	(1,696,059)
Expensed portion of current-period difference between expected and actual experience in the Total Pension Liability	(28,548,838)
Expensed portion of current-period assumption changes	55,494,462
Employee contributions	(25,439,343)
Projected earnings on plan investments	(603,966,170)
Expensed portion of current-period differences between projected and actual earnings on plan investments	66,274,100
Administrative expenses	8,759,341
Other*	(6,878,009)
Recognition of beginning Deferred Outflows of Resources	515,626,387
Recognition of beginning Deferred Inflows of Resources	(193,912,080)
Total Pension Expense	\$884,134,323

* Other includes (\$1,209,160) in unallocated employer contributions, of which (\$1,163,365) is from MOSERS.

Note: System experience and assumption changes are recognized over the average expected remaining service life for all System members, which is 3.650 years.



SECTION IV – NOTES TO FINANCIAL STATEMENTS

The material presented herein will follow the order presented in GASB 68. Paragraph numbers are provided for ease of reference. Amounts are shown in the aggregate, unless otherwise indicated.

Paragraph 76(a) – (d): The required information will be supplied by the Missouri State Employees' Retirement System.

Paragraph 77: This paragraph requires information to be disclosed regarding the actuarial assumptions and other inputs used to measure the TPL. The complete set of actuarial assumptions and other inputs utilized in developing the TPL are outlined in Appendix C. The TPL as of June 30, 2017 was determined based on an actuarial valuation prepared as of June 30, 2017, using the following key actuarial assumptions and other inputs:

Price Inflation	2.50 percent
Payroll Growth	3.00 percent
Salary increases, including wage inflation	3.25 to 8.75 percent; General Assembly is assumed to receive wage inflation only of 3.00 percent.
Long-term Rate of Return, net of investment expense, including price inflation	7.50 percent
Municipal Bond Index Rate	3.56 percent
Year FNP is Projected to be Depleted	N/A
Single Equivalent Interest Rate, net of investment expense, including price inflation	7.50 percent
Cost-of-living adjustment	4.00%, compounded annually, when a minimum COLA of 4.00% is in effect. 2.00%, compounded annually, when no minimum COLA is in effect (80% of price inflation).
Mortality	Pre-retirement mortality rates were based on the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 (scaled by 95% for males and 90% for females).



Post-retirement mortality rates were based on the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%.

Disabled mortality rates were based on the RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 (scaled by 95% for males and 90% for females).

The actuarial assumptions used in the valuation are based on the results of the most recent actuarial experience study, which covered the five-year period ending June 30, 2015. The experience study report, performed by the prior actuary, is dated March 28, 2016.

Paragraph 78

(a): Discount rate (SEIR). The discount rate used to measure the TPL at June 30, 2017 was 7.50%. The discount rate used to measure the TPL at the Prior Measurement Date was 7.65%.

(b): Projected cash flows. The projection of cash flows used to determine the discount rate assumed that plan contributions from members and the employers will be made at the contribution rates summarized below:

- a. Employee contribution rate: 4.00% of salary for members hired on or after 1/1/2011; no contributions for members hired before 1/1/2011.
- b. Employer contribution rate: The actuarial required contribution rate is determined as of the Prior Measurement Date (June 30, 2015 for FYE June 30, 2017) and is subject to a minimum employer contribution rate of 16.97% until the plan is at least 80% funded.
- c. Administrative expenses in the prior year were projected forward with price inflation as an estimate for administrative expenses in the current and future years. The portion of expenses in future years allocated to the current members was based on the proportionate share of covered payroll in each year for the remainder of the existing members to the total covered payroll for all members.

Based on those assumptions, the System's FNP was projected to be available to make all projected future benefit payments of current System members. Therefore, the long-term expected rate of return on System investments of 7.50% was applied to all periods of projected benefit payments to determine the TPL.

The FNP projections are based on the System's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67 and 68. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the System will actually run out of money, the financial condition of the System, or the System's ability to make benefit payments in future years.



(c): Long-term rate of return. The long-term expected rate of return on pension plan investments is reviewed regularly as part of the experience study. The most recent experience analysis was performed and results provided on March 28, 2016 by the prior actuary, GRS Consultants. Generally, several factors are considered in evaluating the long-term rate of return assumption including long-term historical data, estimates inherent in current market data, and an analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation), along with estimates of variability and correlations for each asset class, developed by the System's investment consultant. These ranges were combined to develop the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The capital market assumptions developed by investment consultants are often intended for use over a 10-year investment horizon and are not always useful in setting the long-term rate of return for funding pension plans which covers a longer timeframe.

(d): Municipal bond rate. A municipal bond rate was not used in determining the discount rate. If it were required, the rate would be 3.56% on the Measurement Date.

(e): Period of projected benefit payments. Projected future benefit payments for all current plan members were projected through 2116.

(f): Assumed asset allocation. The target asset allocation and best estimates of real rates of return for each major asset class will be supplied by the System.

(g): Sensitivity analysis. This paragraph requires disclosure of the sensitivity of the NPL to changes in the discount rate. The following presents the NPL of the System, calculated using the discount rate of 7.50 percent, as well as the System's NPL calculated using a discount rate that is 1-percentage-point lower (6.50 percent) or 1-percentage-point higher (8.50 percent) than the current rate.

	1% Decrease (6.50%)	Current Discount Rate (7.50%)	1% Increase (8.50%)
Net Pension Liability	\$6,704,024,789	\$5,206,915,597	\$3,947,666,258

Paragraph 79: The required information will be supplied by the Missouri State Employees' Retirement System.



Paragraph 80:

(a)-(b): This information for each participating employer is provided in Appendix D of this report.

(c): The Measurement Date of the Collective NPL is June 30, 2017. The TPL as of June 30, 2017 was determined based on the annual actuarial funding valuation report prepared as of June 30, 2017.

(d): There was one change in the actuarial assumptions that affected the measurement of the TPL since the Prior Measurement Date. This change was a decrease in the long-term rate of return from 7.65% to 7.50%.

(e): There was one bill passed since the Prior Measurement Date (Senate Bill 62) that made several changes to the MSEP 2011 benefit provisions, which are detailed in Section V of this report.

(f): The information will be supplied by employers participating in the Missouri State Employees' Retirement System.

(g): Please see Section III for the development of the Collective PE. The proportionate share of Collective PE for each participating employer is provided in Appendix D.

(h)(1)-(3): Since certain expense items are recognized over closed periods each year, the deferred portions of these items must be tracked annually. If the amounts will increase PE, then they are labeled Deferred Outflows of Resources. If the amounts serve to reduce PE they are labeled Deferred Inflows of Resources. The recognition of these amounts is accomplished on a level dollar basis, with no interest included in the deferred amounts. Experience gains/losses and the impact of changes in actuarial assumptions or other inputs, if any, are recognized over the average expected remaining service life of the active and inactive System members at the beginning of the measurement period. The difference between projected and actual earnings is recognized over a fixed five-year period.

The following tables provide a summary of the amounts of the Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources as of the Measurement Date (June 30, 2017) for the System. Per GASB 68, reporting of the differences between projected and actual earnings should be on a net basis, with only one Deferred Outflow or Inflow. These are shown separately in the tables below to provide additional detail. Detail by participating employer is provided in Appendix D of this report.



Deferred Outflows of Resources					
	June 30, 2016		Additions	Recognition	June 30, 2017
Differences between expected and actual experience					
2014 Base	\$	2,809,447	\$ 0	\$ 2,809,447	\$ 0
2015 Base		0	0	0	0
2016 Base		44,998,450	0	16,151,633	28,846,817
2017 Base		<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	\$	47,807,897	\$ 0	\$ 18,961,080	\$ 28,846,817
Changes of assumptions					
2014 Base	\$	0	\$ 0	\$ 0	\$ 0
2015 Base		0	0	0	0
2016 Base		483,322,495	0	173,482,590	309,839,905
2017 Base		<u>0</u>	<u>202,554,786</u>	<u>55,494,462</u>	<u>147,060,324</u>
Total	\$	483,322,495	\$ 202,554,786	\$ 228,977,052	\$ 456,900,229
Differences between projected and actual earnings					
2014 Base	\$	0	\$ 0	\$ 0	\$ 0
2015 Base		571,614,492	0	190,538,164	381,076,328
2016 Base		530,578,212	0	132,644,553	397,933,659
2017 Base		<u>0</u>	<u>331,370,502</u>	<u>66,274,100</u>	<u>265,096,402</u>
Total	\$	1,102,192,704	\$ 331,370,502	\$ 389,456,817	\$ 1,044,106,389
Changes in proportion					
2014 Base	\$	0	\$ 0	\$ 0	\$ 0
2015 Base		4,022,414	0	2,138,444	1,883,970
2016 Base		3,908,848	0	1,403,033	2,505,815
2017 Base		<u>0</u>	<u>3,447,061</u>	<u>944,401</u>	<u>2,502,660</u>
Total	\$	7,931,262	\$ 3,447,061	\$ 4,485,878	\$ 6,892,445
Total	\$	1,641,254,358	\$ 537,372,349	\$ 641,880,827	\$ 1,536,745,880



Deferred Inflows of Resources					
	June 30, 2016	Additions	Recognition	June 30, 2017	
Differences between expected and actual experience					
2014 Base	\$ 0	\$ 0	\$ 0	\$ 0	
2015 Base	13,562,619	0	7,210,324	6,352,295	
2016 Base	0	0	0	0	
2017 Base	0	104,203,260	28,548,838	75,654,422	
Total	\$ 13,562,619	\$ 104,203,260	\$ 35,759,162	\$ 82,006,717	
Changes of assumptions					
2014 Base	\$ 0	\$ 0	\$ 0	\$ 0	
2015 Base	27,901,687	0	14,833,433	13,068,254	
2016 Base	0	0	0	0	
2017 Base	0	0	0	0	
Total	\$ 27,901,687	\$ 0	\$ 14,833,433	\$ 13,068,254	
Differences between projected and actual earnings					
2014 Base	\$ 343,736,647	\$ 0	\$ 171,868,323	\$ 171,868,324	
2015 Base	0	0	0	0	
2016 Base	0	0	0	0	
2017 Base	0	0	0	0	
Total	\$ 343,736,647	\$ 0	\$ 171,868,323	\$ 171,868,324	
Changes in proportion					
2014 Base	\$ 0	\$ 0	\$ 0	\$ 0	
2015 Base	4,022,414	0	2,138,444	1,883,970	
2016 Base	3,908,848	0	1,403,033	2,505,815	
2017 Base	0	3,447,061	944,401	2,502,660	
Total	\$ 7,931,262	\$ 3,447,061	\$ 4,485,878	\$ 6,892,445	
Total	\$ 393,132,215	\$ 107,650,321	\$ 226,946,796	\$ 273,835,740	

(h)(4): Changes in each employer's proportionate share are shown on Exhibit 2 in Appendix D. The determination of proportionate share is based on individual employer contribution information, provided by the Missouri State Employees' Retirement System (see Exhibit 1 in Appendix D).

(h)(5): Employer contributions subsequent to the Measurement Date are considered Deferred Outflows of Resources. These amounts, if any, will be provided by each participating employer.



(i): The following table provides the Collective Deferred Outflows of Resources and Collective Deferred Inflows of Resources as of the Measurement Date (June 30, 2017) for the System that will be recognized in PE in future years. **These amounts do not reflect the deferred recognition of changes in proportionate share, recognition of actual contributions that differ from the proportionate share, or employer contributions subsequent to the Measurement Period.**

Appendix D contains the schedule, by participating employer, of the recognition of all amounts except for employer contributions subsequent to the Measurement Date.

Year Ending June 30:	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/(Inflows) of Resources
2018	\$634,585,502	\$219,837,711	\$414,747,791
2019	594,003,778	28,548,838	565,454,940
2020	234,990,053	18,556,746	216,433,307
2021	66,274,102	0	66,274,102
2022	0	0	0
Thereafter	0	0	0

(j): There were no contributions by non-employer contributing entities during the measurement period.



SECTION V – REQUIRED SUPPLEMENTARY INFORMATION

There are several tables of Required Supplementary Information (RSI) that need to be included in the System's financial statements:

Paragraphs 81(a): Information under 81(a)(1) (a)-(b), which is determined as of the Measurement Date of the Collective NPL, is provided in Appendix D of this report.

Paragraphs 81(b): This information is to be determined as of the employer's most recent fiscal year-end. Therefore, each participating employer should have the information available to populate the Schedule of Employer Contributions.

Paragraph 82: Information about factors that significantly affect trends in the amounts reported in the schedules required by paragraph 81 should be presented as notes to the schedules. At this point, only four years are being reported, but comments on additional years will be added as they occur.

Changes of benefit and funding terms: The following changes to the plan provisions were made by the Missouri General Assembly and reflected in the valuation performed as of June 30 listed below:

2017: Senate Bill 62 (SB 62) made the following changes to the MSEP 2011 benefit provisions:

- Active members are now vested after 5 years of service (previously 10 years of service).
- Active members are now eligible for Normal Retirement at age 67 with 5 years of service (previously age 67 with 10 years of service).
- Active members are now eligible for Early Retirement at age 62 with 5 years of service (previously age 62 with 10 years of service).
- Cost-of-living adjustments for vested former members now commence on the second anniversary of the date of retirement (previously commenced on first anniversary).
- Service credit for unused sick leave is only applied for members who terminate service at their early or normal retirement date.
- Survivor benefits for terminated vested members start at the date the member would have been eligible for normal retirement, not at date of death.

2016: None

2015: None

2014: None



Changes in actuarial assumptions and methods:

6/30/2017 valuation:

- The investment return assumption was lowered from 7.65% to 7.50%.

6/30/2016 valuation:

- The long-term rate of return was lowered from 8.00% to 7.65%.
- Salary increases were changed from age based with increases between 3.2% and 5.9% to service based with increase between 3.25% and 8.75%.
- Post-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 healthy annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%.
- Pre-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and scaled by 100% for males and 80% for females to the RP-2014 employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.
- The disabled mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and set forward 10 years to the RP-2014 disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females.
- Retirement rates were changed to better reflect actual experience of the System.
- The assumption for service credit for unused leave upon retirement and military service purchases was changed from 6 months to 8 months (4 months to 5 months for 2011 plan members).
- Withdrawal rates were changed to better reflect actual experience of the System.
- Disability rates were changed to better reflect actual experience of the System.
- Pre-retirement survivor benefits for spouse of terminated vested member liability loads were reduced.
- The marriage assumption at retirement was reduced from 75% to 70%.
- The marriage assumption for in-service deaths was reduced from 70% to 60%.
- The asset smoothing period changed from an open 3-year period to an open 5-year period.

6/30/2015 valuation:

- For the 2015 valuation only, the wage inflation was assumed to be 0% in the first year and 3% thereafter.

6/30/2014 valuation:

- The unfunded actuarial accrued liability amortization method was changed from a level percentage of payroll amortized over an open 30-year period to a level percentage of payroll amortized over a closed 30-year period beginning with the 6/30/2014 valuation.



APPENDIX A

ADDITIONAL INFORMATION

SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY

Measurement Period Ended June 30, 2017

	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) – (b)
Balances at June 30, 2016	\$12,751,162,753	\$8,109,161,214	\$4,642,001,539
Changes for the year:			
Service Cost at end of year	152,766,134		152,766,134
Interest on TPL	945,654,398		945,654,398
Benefit term changes	(1,696,059)		(1,696,059)
Differences between expected and actual experience	(104,203,260)		(104,203,260)
Assumption changes	202,554,786		202,554,786
Employer contributions		335,217,422	(335,217,422)
Non-employer contributions		0	0
Employee contributions		25,439,343	(25,439,343)
Net investment income		272,595,668	(272,595,668)
Benefit payments, including member refunds	(793,964,857)	(793,964,857)	0
Administrative expenses		(8,759,341)	8,759,341
Other		5,668,849	(5,668,849)
Net changes	<u>401,111,142</u>	<u>(163,802,916)</u>	<u>564,914,058</u>
Balances at June 30, 2017	\$13,152,273,895	\$7,945,358,298	\$5,206,915,597



APPENDIX B

SUMMARY OF PLAN PROVISIONS

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>DEFINITIONS</p> <p>Participants</p> <p>All MOSERS members, vested former members, retirees and survivors who first became members prior to July 1, 2000 and who do not elect to transfer to the MSEP 2000 plan. Election is made at the time benefits commence.</p>	<ul style="list-style-type: none"> (1) All new employees who first become members on or after July 1, 2000, except full-time teaching and senior administrative personnel of the regional colleges and universities hired on or after July 1, 2002 who will be participants in the Colleges and Universities Retirement Plan (CURP). (2) MSEP active members and vested former members who elect to transfer to the MSEP 2000 plan prior to retirement. (3) MSEP retirees who elect to transfer to the MSEP 2000 plan during the election window from July 1, 2000 through June 30, 2001, and their survivors. (4) MSEP non-vested terminations rehired on or after July 1, 2000. (5) Members hired prior to January 1, 2011 participating in the CURP for six years may elect to change to MOSERS. Transferred service is for vesting purposes only. 	<ul style="list-style-type: none"> (1) All new employees who first become employees on or after January 1, 2011, except full-time teaching and senior administrative personnel of the regional colleges and universities hired on or after July 1, 2002 who will be participants in the Colleges and Universities Retirement Plan (CURP). (2) Members hired on or after January 1, 2011 participating in the CURP for six years may elect to change to MOSERS. Transferred service is for vesting purposes only.



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>Final average earnings</p> <p>The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).</p> <p>Member contributions</p> <p>None.</p>	<p>The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).</p> <p>Same as MSEP.</p>	<p>The average annual compensation of a member for the three consecutive years of service during which pay was highest (overtime pay is included for purposes of determining Average Compensation). Non-recurring lump sum payments are excluded. Unused sick leave may be converted to additional credited service (usable only for benefit computation, not eligibility).</p> <p>4.0% of salary, with interest credited to member contributions based on the 52-week Treasury bill rate (4% prior to June 30, 2014).</p>



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>ELIGIBILITY FOR BENEFITS</p> <p>Normal retirement</p> <p><i>Members of the General Assembly:</i> Age 55 with completion of at least 3 full biennial assemblies.</p> <p><i>Statewide Elected Officials:</i> The earliest of attaining: (1) Age 65 with at least 4 years of credited service. (2) Age 60 with at least 15 years of credited service. (3) Age 50 with age plus credited service equal to 80 or more.</p> <p><i>General Employees:</i> The earliest of attaining: (1) Age 65 and active with at least 4 years of credited service. (2) Age 65 with at least 5 years of credited service. (3) Age 60 with at least 15 years of credited service. (4) Age 48 with age plus credited service equal to 80 or more.</p>	<p><i>Members of the General Assembly:</i> The earliest of attaining: (1) Age 55 with completion of at least 3 full biennial assemblies. (2) Age 50 with completion of at least 3 full biennial assemblies and with age plus credited service equal to 80 or more.</p> <p><i>Statewide Elected Officials:</i> The earliest of attaining: (1) Age 55 with at least 4 years of credited service. (2) Age 50 with age plus credited service equal to 80 or more.</p> <p><i>General Employees:</i> The earliest of attaining: (1) Age 62 with at least 5 years of credited service. (2) Age 48 with age plus credited service equal to 80 or more.</p>	<p><i>Members of the General Assembly:</i> The earliest of attaining: (1) Age 62 with completion of at least 3 full biennial assemblies. (2) Age 55 with completion of at least 3 full biennial assemblies and with age plus credited service equal to 90 or more.</p> <p><i>Statewide Elected Officials:</i> The earliest of attaining: (1) Age 62 with at least 4 years of credited service as a statewide elected official. (2) Age 55 with age plus credited service equal to 90 or more.</p> <p><i>General Employees:</i> The earliest of attaining: (1) Age 67 with at least 10 years of credited service (5 years effective January 1, 2018). (2) Age 55 with age plus credited service equal to 90 or more.</p>



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p><i>Uniformed Water Patrol Employees:</i> The earliest of attaining:</p> <ul style="list-style-type: none">(1) Age 55 and active with at least 4 years of credited service.(2) Age 55 with at least 5 years of credited service.(3) Age 48 with age plus credited service equal to 80 or more. <p><i>Administrative Law Judges:</i> The earliest of attaining:</p> <ul style="list-style-type: none">(1) Age 62 and active with at least 12 years of credited service.(2) Age 60 with at least 15 years of credited service.(3) Age 55 with at least 20 years of credited service. <p>Early retirement for general employees</p> <p>Age 55 with at least 10 years of credited service.</p>	<p>Age 57 with at least 5 years of credited service.</p>	<p>Age 62 with at least 10 years of credited service (5 years effective January 1, 2018).</p>



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>MONTHLY BENEFITS PAYABLE</p> <p>Normal Retirement</p> <p><i>Members of the General Assembly:</i> \$150 per month per biennial assembly served.</p> <p><i>Statewide Elected Officials:</i></p> <p>1) Less than 12 years of credited service: 1.6% of Average Compensation times years of credited service.</p> <p>2) 12 or more years of credited service: 50% of pay of the highest elected position held prior to retirement.</p> <p><i>General Employees:</i> 1.6% of Average Compensation times years of credited service.</p> <p>2.1% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System.</p> <p><i>Uniformed Water Patrol:</i> 2.13% of Average Compensation times years of credited service.</p>	<p><i>Members of the General Assembly:</i> 1/24 of pay times first 24 years of credited service as a member of the General Assembly.</p> <p><i>Statewide Elected Officials:</i> 1/24 of pay (of the highest elected position held prior to retirement) times the first 12 years of credited service as a statewide elected official.</p> <p><i>General Employees:</i> 1.7% of Average Compensation times years of credited service.</p> <p>Temporary Benefit: If member retires between ages 48 and 62 with age plus credited service equal to 80 or more, a temporary benefit is payable until the attainment of the minimum age at which reduced social security benefits are payable, in the amount of 0.8% of Average Compensation times years of credited service.</p>	<p><i>Members of the General Assembly:</i> 1/24 of pay times first 24 years of credited service as a member of the General Assembly.</p> <p><i>Statewide Elected Officials:</i> 1/24 of pay (of the highest elected position held prior to retirement) times the first 12 years of credited service as a statewide elected official.</p> <p><i>General Employees:</i> 1.7% of Average Compensation times years of credited service.</p> <p>Temporary Benefit: If member retires between ages 55 and 62 with age plus credited service equal to 90 or more, a temporary benefit is payable until the attainment of the minimum age at which reduced social security benefits are payable, in the amount of 0.8% of Average Compensation times years of credited service.</p>

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p><i>Administrative Law Judges:</i> 50% of Compensation</p> <p>Early retirement for general employees</p> <p>Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement.</p> <ol style="list-style-type: none"> 1) Less than 15 years of service: Normal retirement amount actuarially reduced for years younger than age 65. 2) 15 years but less than 20 years of service, and less than the number of years of service necessary for age and service to total 80: Normal retirement amount actuarially reduced for years younger than age 60. 3) 20 or more years of service, but less than the number of years of service necessary for age and service to total 80: Normal retirement amount reduced for years younger than the 80 and out eligibility date. 	<p>Non-Social Security Covered Service: 2.5% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System.</p> <p>Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement, age 62.</p>	<p>Non-Social Security Covered Service: 2.5% of Average Compensation times years of credited service for any period of non-social security covered employment transferred from the Public School Retirement System.</p> <p>Normal retirement amount reduced by ½% for each month that retirement precedes eligibility for normal retirement, age 67.</p>

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)																																																
<p>Vested deferred benefits</p> <p>Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at the age the individual would have been eligible for early or normal retirement, considering years of credited service). Unused sick leave is not converted.</p> <table><tr><th>Years of Service</th><th>General Assembly</th><th>Elected Officials</th><th>General Employees</th></tr><tr><td>4</td><td></td><td>100%</td><td></td></tr><tr><td>5</td><td></td><td></td><td>100%</td></tr><tr><td>6*</td><td>100%</td><td></td><td></td></tr></table> <p>*3 Assemblies</p>	Years of Service	General Assembly	Elected Officials	General Employees	4		100%		5			100%	6*	100%			<p>Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at age 57 for early retirement or 62 for normal retirement). Unused sick leave is converted. CURP to MOSERS transfers with 6 years of service are immediately vested.</p> <table><tr><th>Years of Service</th><th>General Assembly</th><th>Elected Officials</th><th>General Employees</th></tr><tr><td>4</td><td></td><td>100%</td><td></td></tr><tr><td>5</td><td></td><td></td><td>100%</td></tr><tr><td>6*</td><td>100%</td><td></td><td></td></tr></table> <p>*3 Assemblies, HB1455 prospectively</p>	Years of Service	General Assembly	Elected Officials	General Employees	4		100%		5			100%	6*	100%			<p>Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested in accordance with the following schedule (benefits commence at age 67 normal retirement). Unused sick leave is not converted for any new deferred vested members on or after January 1, 2018.</p> <table><tr><th>Years of Service</th><th>General Assembly</th><th>Elected Officials</th><th>General Employees</th></tr><tr><td>4</td><td></td><td>100%</td><td></td></tr><tr><td>6*</td><td>100%</td><td></td><td></td></tr><tr><td>10**</td><td></td><td></td><td>100%</td></tr></table> <p>*3 Assemblies, HB1455 prospectively **5 years of service for General Employees on or after January 1, 2018.</p>	Years of Service	General Assembly	Elected Officials	General Employees	4		100%		6*	100%			10**			100%
Years of Service	General Assembly	Elected Officials	General Employees																																															
4		100%																																																
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6*	100%																																																	
10**			100%																																															
<p>Death prior to retirement</p> <p>The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service and was married on the date of death. If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the service requirement is waived and the minimum</p>	<p>The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service (3 full assemblies for a member of the General Assembly, 4 years of credited service for a statewide elected official). If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the</p>	<p>The surviving spouse benefit is computed as if the member had been normal retirement age on the date of death* and elected the joint and 100% survivor optional form of payment, provided the member had at least 5 years of credited service (2 full assemblies for a member of the General Assembly, 4 years of credited service for a statewide elected official). If no eligible spouse survives, 80% of the member's life income annuity is paid to eligible children until age 21. If the death is duty related, the</p>																																																



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly).</p> <p>Death after retirement</p> <p>50% of the benefit the retired member was receiving on the date of death (the normal form of payment), or the benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement and provided the member was married on their date of retirement. Effective July 1, 2000, a member who is not married at retirement but marries thereafter may designate a spouse as beneficiary within one year of marriage. Additionally, a member may designate a new spouse as beneficiary within one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).</p>	<p>service requirement is waived and the minimum spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly).</p> <p>The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary within one year of marriage. Additionally, a member may designate a new spouse as beneficiary within one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).</p>	<p>service requirement is waived and the minimum spouse benefit is 50% of Average Compensation (rate of compensation for members of the General Assembly).</p> <p>*Effective January 1, 2018, the surviving spouse benefit for terminated vested participants is payable when member would have reached normal retirement age.</p> <p>The benefit payable under the joint and survivor or period certain form of payment, if the member elected an optional form of payment at time of retirement. A member who is not married at retirement but marries thereafter may designate a spouse as beneficiary upon completion of one year of marriage. Additionally, a member may designate a new spouse as beneficiary upon completion of one year of marriage in the event of the death of the spouse the member was married to at the date of retirement (this provision does not apply to period certain annuities).</p>

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)												
<p>Disability</p> <p>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability (if the member retires on or after August 28, 1999, the member's rate of pay is based on the rate of pay at the time of disability indexed to the time of benefit commencement). An exception is Uniformed Water Patrol employees who are eligible for an immediate occupational disability benefit equal to 50% of pay at time of disability.</p> <p>Post-retirement benefit adjustments</p> <p>Benefits are increased to retired members (including survivors) annually in accordance with the following formulas:</p> <table border="1" data-bbox="205 1101 745 1323"> <thead> <tr> <th>Increase in CPI</th><th>Formula 1 Benefit Increase</th><th>Formula 2 Benefit Increase</th></tr> </thead> <tbody> <tr> <td>5.00% or less</td><td>4%</td><td>80% of CPI increase</td></tr> <tr> <td>5.01% - 6.24%</td><td>80% of CPI increase</td><td>80% of CPI increase</td></tr> <tr> <td>6.25% or more</td><td>5%</td><td>5%</td></tr> </tbody> </table>	Increase in CPI	Formula 1 Benefit Increase	Formula 2 Benefit Increase	5.00% or less	4%	80% of CPI increase	5.01% - 6.24%	80% of CPI increase	80% of CPI increase	6.25% or more	5%	5%	<p>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability indexed to the time of benefit commencement. The annual percentage increase in the pay used to compute benefits is the lesser of: i) 80% of the CPI increase and ii) 5%.</p> <p>Benefits are increased to retired members (including survivors) annually in accordance with the following:</p> <p><i>Members of the General Assembly:</i> Benefit is adjusted annually based on the increase in the pay for an active member of the General Assembly.</p>	<p>Normal retirement benefits become payable at the time the member is eligible for normal retirement, and are computed based on: i) the service that would have accrued to the member if active employment had continued; and ii) the member's rate of pay at the time of disability indexed to the time of benefit commencement. The annual percentage increase in the pay used to compute benefits is the lesser of: i) 80% of the CPI increase and ii) 5%.</p> <p>Benefits are increased to retired members (including survivors) annually in accordance with the following:</p> <p><i>Members of the General Assembly:</i> Benefit is adjusted annually based on the increase in the pay for an active member of the General Assembly.</p>
Increase in CPI	Formula 1 Benefit Increase	Formula 2 Benefit Increase												
5.00% or less	4%	80% of CPI increase												
5.01% - 6.24%	80% of CPI increase	80% of CPI increase												
6.25% or more	5%	5%												

MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>Members first hired prior to August 28, 1997 receive COLAs based on Formula 1 until an aggregate increase of 65% is reached. At that point subsequent COLAs based on Formula 2 are granted.</p> <p>Members first hired on or after August 28, 1997 receive COLAs based solely on Formula 2.</p> <p>Statewide Elected Officials with 12 or more years of service have their benefit adjusted annually based on the increase in the pay for an active statewide elected official in the member's highest elected position.</p> <p>Members who are fully vested and work beyond age 65 will have their monthly benefit increased upon retirement. The percentage increase in benefit is equal to all COLAs for the years between age 65 and date of retirement, not to exceed 65% and counts toward the Formula 1 65% maximum.</p>	<p><i>Statewide Elected Officials:</i> Benefit is adjusted annually based on the increase in the pay for an active statewide elected official in the retired member's highest elected position.</p> <p><i>General Employees:</i> Annual benefit percentage increase equal to the lesser of: i) 80% of the CPI increase, and 5%.</p> <p>CPI: For the basis of determining CPI, the average monthly reported CPI for the prior calendar year is divided by the average monthly reported CPI for the second prior calendar year to determine the current year increases, if any. If this amount is less than one, benefits are not reduced, nor is there any cumulative effect on future years determination of CPI.</p> <p>Timing of Increase: Benefits are adjusted on the anniversary of the effective date of retirement for most members. Members retiring under the BackDROP provisions have an anniversary based on the retroactive starting date for the BackDROP.</p>	<p><i>Statewide Elected Officials:</i> Benefit is adjusted annually based on the increase in the pay for an active statewide elected official in the retired member's highest elected position.</p> <p><i>General Employees:</i> Annual benefit percentage increase equal to the lesser of: i) 80% of the CPI increase, and 5%.</p> <p>CPI: For the basis of determining CPI, the average monthly reported CPI for the prior calendar year is divided by the average monthly reported CPI for the second prior calendar year to determine the current year increases, if any. If this amount is less than one, benefits are not reduced, nor is there any cumulative effect on future years determination of CPI.</p> <p>Timing of Increase: Benefits are adjusted on the anniversary of the effective date of retirement.</p>



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>Pop-up provision</p> <p>Benefits to members who choose a survivor form of payment and whose spouse precedes the member in death, will "pop-up" or revert to the amount the member would have received had he/she not elected a survivor option.</p> <p>Portability</p> <p>Purchase/Transfer Provisions (in addition to military). Effective August 28, 1999, a member may purchase up to four years of non-federal full-time Missouri public service, provided the member is not vested in another retirement system for that same service.</p>	<p>Same.</p> <p>Purchase/Transfer Provisions (in addition to military). A member may purchase up to four years of non-federal full-time Missouri public service, provided the member is not vested in another retirement system for that same service. Local vested service credit granted after 10 years of state service if the other retirement plan agrees to transfer assets equal to the accrued liability to MOSERS.</p>	<p>Same.</p> <p>May purchase qualifying public sector service at full actuarial cost.</p>



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>BackDROP</p> <p>To be eligible to participate in the BackDROP, a member must have been eligible to retire under normal retirement age and/or service conditions for at least two years. A retroactive starting date is established for BackDROP purposes which is the later of: 1) the member's normal retirement date or 2) five years prior to the annuity starting date under the retirement plan selected by the member.</p> <p>A member may elect the BackDROP period for the accumulation of the BackDROP account in 12 month increments prior to their actual retirement date or back to the earliest possible date. This results in a BackDROP period of one to five years depending upon the individual situation.</p> <p>A theoretical BackDROP account is accumulated that includes 90% of the value of the benefit payments that would have been paid during the BackDROP period had the member retired at the retroactive starting date with their respective option election. These payments include applicable post-retirement benefit increases.</p>	Same as MSEP.	Not eligible for the BackDROP.



MSEP (Missouri State Employees' Plan)	MSEP 2000 (Missouri State Employees' Plan 2000)	MSEP 2011 (Missouri State Employees' Plan 2011)
<p>The member is paid the resulting lump sum value of the BackDROP account as of the annuity starting date or as three equal annual installments beginning at the annuity starting date.</p> <p>The annuity benefit payable from the actual retirement date is computed with years of service and average pay as of the retroactive starting date for the BackDROP. Post-retirement benefit increases that occurred during the BackDROP period are applied in the calculation of the monthly annuity.</p>		



APPENDIX C

STATEMENT OF ACTUARIAL ASSUMPTIONS

ACTUARIAL ASSUMPTIONS

Economic Assumptions

1. Long-term Rate of Return 7.50%, compounded annually, net of investment expenses.
(7.65% in June 30, 2016 valuation)
2. Inflation 2.50% per year
3. Salary Increases Rates vary by service for all active members, except General Assembly. Sample rates are as follows:

Rates by Service	
Years	Rate
1	8.75 %
2	5.50
3	4.50
4	4.25
5	4.00
9	3.75
10	3.50
25+	3.25

Salary increases for General Assembly members are assumed to be at the payroll growth assumption of 3.00% per year.

4. Payroll Growth 3.00% per year
5. Cost-of-Living Adjustment (COLA) 4.00% on a compounded basis when a minimum COLA of 4.00% is in effect. 2.00% on a compounded basis when no minimum COLA is in effect.
6. Interest on Member Contributions 1.50% per year

Demographic Assumptions

1. Mortality
 - a. Post-retirement The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.
RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 120%
 - b. Pre-retirement RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females



c. Long-term disability

RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females

2. Retirement Assumption

Retirement Age	Normal Retirement			MSEP 2011**	Early Retirement		
	MSEP and MSEP 2000*				Retirement Age	MSEP and MSEP 2000	MSEP 2011
	Percent Retiring			Percent Retiring		Percent Retiring	Percent Retiring
	1 st Year	2 nd Year	3 rd Year				
48	20 %						
49	20	10 %					
50	20	10	21 %				
51	20	10	21				
52	20	10	21				
53	20	10	21				
54	20	10	21				
55	20	10	21	45 %			
56	20	10	21	45			
57	20	10	21	35	57	2.4 %	
58	20	10	21	35	58	3.1	
59	20	10	21	30	59	3.0	
60	20	10	21	35	60	5.1	
61	19	10	21	25	61	6.0	
62	18	22	29	40	62	6.0	10 %
63	16	18	24	30	63	6.0	10
64	15	17	17	20	64	6.0	10
65	19	19	27	30	65		50
66	24	25	28	25	66		50
67	10	25	23	20	67		
68	20	25	23	20	68		
69	20	25	23	20	69		
70	20	25	23	20	70		
71	20	25	23	20	71		
72	20	25	23	20	72		
73	20	25	23	20	73		
74	20	25	23	20	74		
75	50	50	23	50	75		
76	50	50	23	50	76		
77	75	75	23	75	77		
78	100	100	100	100	78		

* For members hired prior to January 1, 2011.

** For members hired on or after January 1, 2011.



3. Termination From Active Employment

Sample Age	Years of Service	<u>Percent of Active Members Separating within the Next Year</u>					
		Termination**		Death*		Disability	
		Males	Females	Males	Females	Males	Females
	0-1	24.0 %	27.5 %				
	1-2	19.0	21.5				
	2-3	15.5	16.3				
	3-4	13.3	13.5				
	4-5	11.2	11.3				
25	5+	13.5 %	14.0 %	0.03 %	0.01%	0.10 %	0.10 %
30		10.6	11.0	0.03	0.02	0.10	0.10
35		8.2	8.5	0.04	0.03	0.10	0.10
40		5.8	6.0	0.05	0.03	0.36	0.36
45		4.3	4.5	0.07	0.05	0.41	0.41
50		2.9	3.0	0.13	0.08	0.57	0.57
55		2.9	3.0	0.22	0.14	0.77	0.77
60		2.9	3.0	0.40	0.20	1.02	1.02
65		2.9	3.0	0.70	0.30	1.23	1.23
70		2.9	3.0	1.17	0.50	1.23	1.23

* The pre-retirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 95% for males and 90% for females. 2% of the deaths in active service are assumed to be duty related.

** Does not apply to Elected Officials and Legislators.

Elected Officials and Legislators

Years of Service	Percent of Active Members Separating within the Next Year
	Termination
	Male/Female
0-1	8.0 %
1-2	8.0
2-3	8.0
3-4	8.0
4-5	12.0
5-6	12.0
6-7	12.0
7+	35.0



Other Assumptions

1. Form of Payment
MSEP – 50% joint and survivor
MSEP 2000 and MSEP 2011 – Straight life annuity
2. Marital Status
 - a. Percent married
70% married at retirement, 60% of those dying in active service are married
 - b. Spouse's age
Females assumed to be three years younger than males.
3. Pay Increase Timing
Beginning of the fiscal year.
4. Decrement Timing
Decrements of all types are assumed to occur mid-year.
5. Eligibility Testing
Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
6. Benefit Service
Exact fractional service is used to determine the amount of the benefit payable.
7. Decrement Relativity
Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
8. Decrement Operation
Disability and withdrawal do not operate during normal retirement eligibility.
9. Other Liability Adjustments
Pre-Retirement Survivor Benefits for Spouse of Terminated Vested Member

Age	Male/Female
<30	1.57/1.31
30-39	1.24/1.13
40-49	1.09/1.05
>50	1.02/1.01

These factors are used to estimate the cost of immediate unreduced survivor annuities upon the death of a vested member.

10. Incidence of Contributions
Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost



contributions are applied to the funding of new entrant benefits.

11. MSEP 2000 Election

All regular state employees hired on or before June 30, 2000 are assumed to elect MSEP 2000 prior to age 62 and MSEP on or after age 62. Elected Officials, General Assembly, and Uniformed Water Patrol Members hired before July 1, 2000 and Administrative Law Judges hired before April 26, 2005 are assumed to elect MSEP at retirement.

12. Service Adjustment

It is assumed that each member will be granted 8 months of service credit, 4 months for unused leave upon retirement and 4 months for military service purchases. For members hired on or after January 1, 2011 it is assumed that each member will be granted 5 months for unused leave.

13. Forfeitures

MSEP - For those hired on or after January 1, 2011, 50% of state employees terminating at first vesting eligibility are assumed to take a refund and forfeit their deferred pension. This percentage decreases to 0% at first retirement eligibility.

14. Salary and Benefit Limits

For purposes of the valuation, no limits were applied to member compensation or benefits.

15. Commencement age for deferred vested benefit

Normal Retirement Date



Data Adjustments

Active and retired member data was reported as of May 31, 2017. It was brought forward to June 30, 2017 by adding one month of service for all active members and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

Active members reported with less than a \$100 annualized salary were assumed to receive the average active member pay.

When the option of choosing plans is available, terminated vested members are reported with two records, one with benefits under the MSEP plan and one with benefits under the MSEP 2000 plan. Because it is unknown what the member will elect at retirement, both records are valued and the plan that produces the higher present value of future benefits is used for valuation purposes.

For any retired member who has elected a joint and survivor benefit yet has no beneficiary date of birth provided, it was assumed that the beneficiary is 3 years younger for male retirees and 3 years older for female retirees.

For members reported with no gender, the member is assumed to be male.

Due to limitations in our valuation program, members who are not eligible for normal retirement prior to age 85 had their date of birth adjusted.

TECHNICAL VALUATION PROCEDURES

Other Valuation Procedures

Salary increases are assumed to apply to annual amounts.

Decrementations are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%. Standard adjustments are made for multiple decrementations.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.



APPENDIX D

DETAILED INFORMATION FOR PARTICIPATING EMPLOYERS



Exhibit 1

Missouri State Employees' Retirement System Schedule of Employer Allocations For the Years Ended 6/30/2016 and 6/30/2017

Entity	Year Ended June 30, 2016		Year Ended June 30, 2017	
	Employer Contributions	Employer Allocated Proportion	Employer Contributions	Employer Allocated Proportion
Total	\$328,656,218		\$334,008,262	
State of Missouri	269,683,643	82.056456%	273,998,459	82.033437%
MO Technology Corporation	32,218	0.009803%	32,198	0.009640%
MO Wine and Grape Board	43,700	0.013297%	42,265	0.012654%
MO Public Entity Risk Management	111,857	0.034035%	110,353	0.033039%
MO Housing Development Commission	1,034,585	0.314792%	1,049,129	0.314103%
MO Development Finance Board	79,588	0.024216%	84,888	0.025415%
State Environmental Improvement & Energy Resource Authority	60,252	0.018333%	60,763	0.018192%
MO Agriculture & Small Business Development Authority	39,456	0.012005%	30,332	0.009081%
State Technical College of MO	1,465,937	0.446040%	1,457,958	0.436504%
MCHCP	514,420	0.156522%	511,844	0.153243%
MO State University	16,495,433	5.019054%	16,737,983	5.011248%
University of Central MO	9,396,499	2.859066%	9,672,602	2.895917%
Southeast MO State University	8,072,759	2.456293%	8,209,307	2.457816%
Truman State University	5,503,067	1.674414%	5,597,262	1.675785%
Northwest Missouri State University	5,066,237	1.541500%	5,269,462	1.577644%
MO Southern State University	3,586,368	1.091222%	3,482,606	1.042671%
MO Western State University	3,492,782	1.062746%	3,563,977	1.067033%
Lincoln University	2,702,988	0.822436%	2,734,246	0.818616%
Harris Stowe State University	1,274,429	0.387770%	1,362,628	0.407962%



Exhibit 2

Missouri State Employees' Retirement System Schedule of Deferred Resources Measurement Date: 6/30/2017

Entity	Deferred Outflows of Resources							Deferred Inflows of Resources					
	6/30/16 Net Pension Liability (NPL)	6/30/17 Net Pension Liability (NPL)	Differences Between Expected and Actual Experience	Net Difference Between Projected and Actual Earnings on Pension Plan Investments	Changes of Assumptions	Changes in Proportion	Total Deferred Outflows of Resources	Differences Between Expected and Actual Experience	Net Difference Between Projected and Actual Earnings on Pension Plan Investments	Changes of Assumptions	Changes in Proportion	Total Deferred Inflows of Resources	
Total	\$4,642,001,539	\$5,206,915,597	\$28,846,817	\$1,044,106,389	\$456,900,229	\$6,892,445	\$1,536,745,880	\$82,006,717	\$171,868,324	\$13,068,254	\$6,892,445	\$273,835,740	
State of Missouri	3,809,061,950	4,271,411,823	23,664,033	856,516,357	374,810,963	0	1,254,991,353	67,272,929	140,989,494	10,720,335	2,545,308	221,528,066	
MO Technology Corporation	455,055	501,947	2,781	100,652	44,045	31,279	178,757	7,905	16,568	1,260	4,016	29,749	
MO Wine and Grape Board	617,247	658,883	3,650	132,121	57,816	42,236	235,823	10,377	21,748	1,654	16,805	50,584	
MO Public Entity Risk Management	1,579,905	1,720,313	9,531	344,962	150,955	12,992	518,440	27,094	56,784	4,318	44,705	132,901	
MO Housing Development Commission	14,612,649	16,355,078	90,609	3,279,569	1,435,137	174,760	4,980,075	257,586	539,844	41,048	29,976	868,454	
MO Development Finance Board	1,124,107	1,323,338	7,331	265,360	116,121	29,544	418,356	20,842	43,680	3,321	17,340	85,183	
State Environmental Improvement & Energy Resource Authority	851,018	947,242	5,248	189,944	83,119	28,446	306,757	14,919	31,266	2,377	3,474	52,036	
MO Agriculture & Small Business Development Authority	557,272	472,840	2,620	94,815	41,491	37,278	176,204	7,447	15,607	1,187	77,896	102,137	
State Technical College of MO	20,705,184	22,728,395	125,918	4,557,566	1,994,388	475,496	7,153,368	357,963	750,212	57,043	234,972	1,400,190	
MCHCP	7,265,754	7,979,234	44,206	1,600,020	700,168	14,964	2,359,358	125,670	263,376	20,026	128,802	537,874	
MO State University	232,984,564	260,931,454	1,445,586	52,322,761	22,896,404	1,389,723	78,054,474	4,109,560	8,612,748	654,883	192,344	13,569,535	
University of Central MO	132,717,888	150,787,954	835,380	30,236,454	13,231,451	1,849,571	46,152,856	2,374,846	4,977,164	378,446	0	7,730,456	
Southeast MO State University	114,021,159	127,976,405	709,002	25,662,214	11,229,767	596,009	38,196,992	2,015,574	4,224,207	321,194	0	6,560,975	
Truman State University	77,726,324	87,256,711	483,411	17,496,978	7,656,666	33,781	25,670,836	1,374,256	2,880,144	218,996	767,558	5,240,954	
Northwest Missouri State University	71,556,454	82,146,592	455,100	16,472,282	7,208,259	1,303,049	25,438,690	1,293,774	2,711,470	206,171	99,806	4,311,221	
MO Southern State University	50,654,542	54,290,999	300,777	10,886,595	4,763,966	0	15,951,338	855,060	1,792,021	136,259	1,750,447	4,533,787	
MO Western State University	49,332,686	55,559,508	307,805	11,140,960	4,875,276	105,633	16,429,674	875,039	1,833,892	139,443	140,402	2,988,776	
Lincoln University	38,177,492	42,624,644	236,145	8,547,222	3,740,258	144,369	12,667,994	671,320	1,406,942	106,979	711,344	2,896,585	
Harris Stowe State University	18,000,289	21,242,237	117,684	4,259,557	1,863,979	623,315	6,864,535	334,556	701,157	53,314	127,250	1,216,277	

In addition, it is the employer's responsibility to adjust these numbers for any employer contributions subsequent to the Measurement Date, which are to be reported as a Deferred Outflow of Resources. Please consult GASB 68, Paragraph 89.



Exhibit 3

Missouri State Employees' Retirement System Schedule of Pension Amounts by Employer Measurement Date: 6/30/2017

Entity	Pension Expense Net Recognition of Deferred Amounts from		
	Proportionate Share of Plan Pension Expense	Changes in Proportionate Share	Total Employer Pension Expense
Total	\$884,134,323	\$0	\$884,134,323
State of Missouri	725,285,773	(2,099,160)	723,186,613
MO Technology Corporation	85,231	23,198	108,429
MO Wine and Grape Board	111,878	16,580	128,458
MO Public Entity Risk Management	292,109	(5,802)	286,307
MO Housing Development Commission	2,777,092	76,690	2,853,782
MO Development Finance Board	224,703	386	225,089
State Environmental Improvement & Energy Resource Authority	160,842	17,468	178,310
MO Agriculture & Small Business Development Authority	80,288	11,851	92,139
State Technical College of MO	3,859,282	192,796	4,052,078
MCHCP	1,354,874	(40,382)	1,314,492
MO State University	44,306,164	1,039,643	45,345,807
University of Central MO	25,603,796	1,266,597	26,870,393
Southeast MO State University	21,730,395	533,741	22,264,136
Truman State University	14,816,190	(478,687)	14,337,503
Northwest Missouri State University	13,948,492	453,724	14,402,216
MO Southern State University	9,218,612	(848,870)	8,369,742
MO Western State University	9,434,005	(56,271)	9,377,734
Lincoln University	7,237,665	(217,239)	7,020,426
Harris Stowe State University	3,606,932	113,737	3,720,669



Exhibit 4

Missouri State Employees' Retirement System Schedule of Recognition Amounts by Employer Measurement Date: 6/30/2017

Entity	NPL Sensitivities			Schedule of Recognition of Deferred Outflows/(Inflows) of Resources for Fiscal Year					
	1% Decrease (6.50%)	Current Discount Rate (7.50%)	1% Increase (8.50%)	2018	2019	2020	2021	2022	Thereafter
Total	\$6,704,024,789	\$5,206,915,597	\$3,947,666,258	\$414,747,791	\$565,454,940	\$216,433,307	\$66,274,102	\$0	\$0
State of Missouri	5,499,541,951	4,271,411,823	3,238,406,314	338,315,314	463,372,493	177,408,558	54,366,925	0	0
MO Technology Corporation	646,268	501,947	380,555	61,489	61,250	19,880	6,389	0	0
MO Wine and Grape Board	848,327	658,883	499,538	69,190	84,161	23,502	8,386	0	0
MO Public Entity Risk Management	2,214,943	1,720,313	1,304,269	129,471	168,686	65,487	21,896	0	0
MO Housing Development Commission	21,057,543	16,355,078	12,399,738	1,381,181	1,846,614	675,659	208,169	0	0
MO Development Finance Board	1,703,828	1,323,338	1,003,299	106,043	148,033	62,253	16,844	0	0
State Environmental Improvement & Energy Resource Authority	1,219,596	947,242	718,159	92,250	111,892	38,521	12,057	0	0
MO Agriculture & Small Business Development Authority	608,792	472,840	358,488	44,479	21,588	1,981	6,018	0	0
State Technical College of MO	29,263,336	22,728,395	17,231,721	1,999,609	2,577,173	887,106	289,289	0	0
MCHCP	10,273,449	7,979,234	6,049,522	593,169	814,904	311,850	101,560	0	0
MO State University	335,955,308	260,931,454	197,827,346	21,745,221	28,619,725	10,798,831	3,321,160	0	0
University of Central MO	194,142,994	150,787,954	114,321,138	13,184,171	16,828,533	6,490,452	1,919,243	0	0
Southeast MO State University	164,772,594	127,976,405	97,026,373	10,678,894	13,999,489	5,328,738	1,628,895	0	0
Truman State University	112,345,042	87,256,711	66,154,399	6,486,077	9,197,952	3,635,242	1,110,611	0	0
Northwest Missouri State University	105,765,645	82,146,592	62,280,120	7,010,447	9,438,456	3,632,997	1,045,569	0	0
MO Southern State University	69,900,922	54,290,999	41,161,171	3,496,056	5,267,223	1,963,251	691,021	0	0
MO Western State University	71,534,157	55,559,508	42,122,902	4,373,339	6,025,069	2,335,323	707,167	0	0
Lincoln University	54,880,220	42,624,644	32,316,228	3,158,453	4,321,755	1,748,671	542,530	0	0
Harris Stowe State University	27,349,874	21,242,237	16,104,978	1,822,938	2,549,944	1,005,005	270,373	0	0

Deferred Outflows for contributions made after 6/30/17 are not reflected. Please consult GASB 68, Paragraph 89.



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GASB STATEMENT NO. 68 REPORT

FOR THE

MISSOURI STATE EMPLOYEES'

RETIREMENT SYSTEM

JUDGES

MEASUREMENT DATE: JUNE 30, 2017





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

February 7, 2018

Board of Trustees
Missouri State Employee' Retirement System
907 Wildwood Drive
Jefferson City, Missouri 65109

Dear Board Members:

Presented in this report is information to assist the Missouri State Employees' Retirement System in providing information required under the Governmental Accounting Standards Board (GASB) Statement No. 68 to the State of Missouri. GASB Statement No. 68 establishes accounting and financial reporting requirements for governmental employers who provide pension benefits to their employees through a trust. This report has been prepared as of June 30, 2017. The calculations in this report have been made on a basis that is consistent with our understanding of this accounting standard (GASB 68).

The annual actuarial valuation used as a basis for much of the information presented in this report was performed as of June 30, 2017. The valuation was based upon data, furnished by the System's staff, concerning active, inactive and retired members along with pertinent financial information. This information was reviewed for completeness and internal consistency, but was not audited by us. The valuation results depend on the integrity of the data. If any of the information is inaccurate or incomplete, our results may be different and our calculations may need to be revised. Please see the actuarial valuation for additional details on the funding requirements for the System including actuarial assumptions and methods and the funding policy.

To the best of our knowledge, the information contained in this report is complete and accurate. The calculations were performed by qualified actuaries according to generally accepted actuarial principles and practices, as well as in conformity with Actuarial Standards of Practice issued by the Actuarial Standards Board. The calculations are based on the current provisions of the System, and on actuarial assumptions that are internally consistent and individually reasonable based on the actual experience of the System. In addition, the calculations were completed in compliance with applicable law and, in our opinion, meet the requirements of GASB 68.



Board of Trustees
February 7, 2018
Page 2

These results are only for financial reporting and may not be appropriate for funding purposes or other types of analysis. Calculations for purposes other than satisfying the requirements of GASB 68 may produce significantly different results. Future actuarial results may differ significantly from the current results presented in this report due to such factors as changes in plan experience or changes in economic or demographic assumptions.

We, Patrice A. Beckham, FSA and Bryan K. Hoge, FSA, are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein. We are available to answer any questions on the material contained in this report or to provide explanations or further details as may be appropriate.

Respectfully submitted,

A handwritten signature in blue ink that reads 'Patrice Beckham' in a cursive script.

Patrice Beckham, FSA, EA, FCA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink that reads 'Bryan K. Hoge' in a cursive script.

Bryan K. Hoge, FSA, EA, FCA, MAAA
Senior Actuary



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GASB STATEMENT NO. 68

MISSOURI STATE EMPLOYEES' RETIREMENT SYSTEM

SECTION I - SUMMARY OF PRINCIPAL RESULTS

Valuation Date (VD):	June 30, 2017
Prior Measurement Date:	June 30, 2016
Measurement Date (MD):	June 30, 2017
Membership Data:	
Retirees and Beneficiaries	559
Inactive Vested Members	26
Inactive Nonvested Members	0
Active Employees	<u>410</u>
Total	995
Single Equivalent Interest Rate (SEIR):	
Long-Term Expected Rate of Return	7.50%
Municipal Bond Index Rate at Prior Measurement Date	2.85%
Municipal Bond Index Rate at Measurement Date	3.56%
Year in which Fiduciary Net Position is Projected to be Depleted	N/A
Single Equivalent Interest Rate at Prior Measurement Date	7.65%
Single Equivalent Interest Rate at Measurement Date	7.50%
Net Pension Liability:	
Total Pension Liability (TPL)	\$564,417,925
Fiduciary Net Position (FNP)	<u>137,634,941</u>
Net Pension Liability (NPL = TPL – FNP)	\$426,782,984
FNP as a percentage of TPL	24.39%
Collective Pension Expense:	\$62,413,611
Collective Deferred Outflows of Resources:	\$48,698,517
Collective Deferred Inflows of Resources:	\$12,788,463



SECTION II – INTRODUCTION

The Governmental Accounting Standards Board issued Statement No. 68 (GASB 68), “*Accounting and Financial Reporting for Pensions*” in June 2012. GASB 68’s effective date for employers was the first fiscal year beginning after June 15, 2014. The Missouri State Employees’ Retirement System for Judges (Judges or System) is a single-employer defined benefit pension plan.

This report, prepared as of June 30, 2017 (the Measurement Date), presents information to assist Missouri State Employees’ Retirement System for Judges in providing the required information under GASB 68 to the State of Missouri. Much of the material provided in this report, including the Net Pension Liability, is based on the results of the GASB 67 report for the Missouri State Employees’ Retirement System for Judges, which was issued October 10, 2017. See the GASB 67 report for more information on the member data, actuarial assumptions, and methods used in developing the GASB 67 results.

GASB 68 requires the inclusion of a Net Pension Liability (NPL) on the employer’s Statement of Net Position and a determination of a Pension Expense (PE) in the Notes to the Financial Statements, that may bear little relationship to the employer’s funding requirements. In fact, it is possible in some years for the NPL to be an asset or the PE to be an income item. The NPL is set equal to the Total Pension Liability (TPL) minus the Fiduciary Net Position (FNP). The benefit provisions recognized in the calculation of the TPL are summarized in Appendix B.

PE includes amounts for Service Cost (the Normal Cost under Entry Age Normal (EAN) for the year), interest on the TPL, employee contributions, administrative expenses, other cash flows during the year, recognition of increases/decreases in the TPL due to changes in the benefit structure, actual versus expected experience, actuarial assumption changes, and recognition of investment gains/losses. The actual experience and assumption change impacts are recognized over the average expected remaining service life of the System membership as of the beginning of the measurement period, while investment gains/losses are recognized equally over five years. The development of the PE is shown in Section III.

The unrecognized portions of each year’s experience, assumption changes and investment gains/losses are used to develop the Deferred Outflows of Resources and Deferred Inflows of Resources, which also must be included on the employer’s Statement of Net Position.

Among the items needed for the TPL calculation is a discount rate, as defined by GASB, or a Single Equivalent Interest Rate (SEIR). To determine the SEIR, the FNP must be projected into the future for as long as there are anticipated benefits payable under the plan provisions applicable to the membership and beneficiaries of the System on the Measurement Date. If the FNP is not projected to be depleted at any point in the future, the long-term expected rate of return on plan investments expected to be used to finance the benefit payments may be used as the SEIR.

If, however, the FNP is projected to be depleted at a future measurement date, the SEIR is determined as the single rate that will generate a present value of benefit payments equal to the sum of the present value



determined by discounting all projected benefit payments through the date of depletion by the long-term expected rate of return, and the present value determined by discounting those benefits after the date of depletion by a 20-year tax-exempt municipal bond (rating AA/Aa or higher) rate. The rate used, if necessary, for this purpose is the monthly average of the Bond Buyers General Obligation 20-year Municipal Bond Index Rate (formerly published monthly by the Board of Governors of the Federal Reserve System).

Our calculations indicate that the FNP is not projected to be depleted, so the Municipal Bond Index Rate is not used in the determination of the SEIR. The SEIR for the Measurement Date is 7.50%, the long-term assumed rate of return on investments. The SEIR for the Prior Measurement Date was 7.65%.

The FNP projections are based on the System's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67 and 68. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the fund will actually run out of money, the financial condition of the System, or the System's ability to make benefit payments in future years.

The sections that follow provide the results of all the required calculations, presented in the order laid out in GASB 68 for note disclosure and Required Supplementary Information (RSI).



SECTION III – PENSION EXPENSE

As noted earlier, the Pension Expense (PE) consists of a number of different items. GASB 68 refers to the first item as Service Cost, which is the Normal Cost using the Entry Age Normal (EAN) actuarial funding method. The second item is interest on the TPL at 7.65%, the SEIR in effect as of the Prior Measurement Date.

The next three items refer to any changes that occurred in the TPL due to:

- benefit changes,
- actual versus expected experience, or
- changes in actuarial assumptions or other inputs.

Benefit changes, which are reflected immediately in PE, will increase PE if there is a benefit improvement for existing System members, or decrease PE if there is a benefit reduction. For the plan year ended June 30, 2017, there were no benefit changes to be recognized.

The next item to be recognized is the portion of current year change in TPL due to actual versus expected System experience for the year. The portion to recognize in the current year is determined by spreading the total change over the average expected remaining service life of the entire System membership at the beginning of the measurement period. The average expected remaining service life of active members is the average number of years the active members are expected to remain in covered employment. At the beginning of the measurement period, this number is 9.272 years. The average expected remaining service life of the inactive members is zero. Therefore, the recognition period is the weighted average of these two amounts, or 3.821 years.

The last item under changes in TPL is changes in actuarial assumptions or other inputs. There was one change in the actuarial assumptions or other inputs since the Prior Measurement Date. This change was a decrease in the long-term rate of return from 7.65% to 7.50%. This change will be recognized over the average expected remaining service life of the entire System membership, using the same approach that applied to experience gains and losses, as described earlier.

Employee contributions for the year and projected earnings on the FNP (using long-term expected rate of return) are subtracted from the amount determined thus far. One-fifth of the current-period difference between projected and actual earnings on the FNP is recognized in the PE.

The current year portions of previously determined experience, assumption changes and earnings amounts, recognized as Deferred Outflows of Resources and Deferred Inflows of Resources are included next. Deferred Outflows of Resources are added to the PE while Deferred Inflows of Resources are subtracted from the PE. Finally, administrative expenses and other miscellaneous items are included.

The calculation of the PE for the year ended June 30, 2017 is shown in the following table.



**Pension Expense
For the Year Ended**

June 30, 2017	
Service Cost at end of year	\$12,945,567
Interest on the Total Pension Liability	40,617,091
Benefit term changes	0
Expensed portion of current-period difference between expected and actual experience in the Total Pension Liability	(2,796,936)
Expensed portion of current-period assumption changes	2,068,952
Employee contributions	(786,745)
Projected earnings on plan investments	(9,937,309)
Expensed portion of current-period differences between projected and actual earnings on plan investments	1,051,436
Administrative expenses	150,387
Other	0
Recognition of beginning Deferred Outflows of Resources	22,919,334
Recognition of beginning Deferred Inflows of Resources	(3,818,166)
Total Pension Expense	\$62,413,611

Note: System experience and assumption changes are recognized over the average expected remaining service life for all System members, which is 3.821 years.



SECTION IV – NOTES TO FINANCIAL STATEMENTS

The material presented herein will follow the order presented in GASB 68. Paragraph numbers are provided for ease of reference.

Paragraph 37: The information required is to be prepared by the System and employer.

Paragraph 38: The information required is to be prepared by the System and employer.

Paragraph 39: Not Applicable.

Paragraph 40(a) – (b): The information required is to be supplied by the System.

Paragraph 40(c): The data required regarding the membership of the System were furnished by the System. The following table summarizes the membership of the System as of June 30, 2017, the date of the valuation used to determine the June 30, 2017 TPL.

Membership

Number as of June 30, 2017	
Inactive Members Or Their Beneficiaries	559
Currently Receiving Benefits	
Inactive Members Entitled To But Not Yet	26
Receiving Benefits	
Inactive Nonvested Members	0
Active Members	410
Total	995

Paragraph 40(d) – (e): The information required is to be supplied by the System.

Paragraph 41: This paragraph requires information to be disclosed regarding the actuarial assumptions and other inputs used to measure the TPL. The complete set of actuarial assumptions and other inputs utilized in developing the TPL are outlined in Appendix C. The TPL as of June 30, 2017 was determined based on an actuarial valuation prepared as of June 30, 2017, using the following key actuarial assumptions and other inputs:



Price Inflation	2.50 percent
Payroll Growth	3.00 percent
Salary increases, including wage inflation	3.00 to 5.20 percent
Long-term Rate of Return, net of investment expense, including price inflation	7.50 percent
Municipal Bond Index Rate	3.56 percent
Year FNP is projected to be depleted	N/A
Single Equivalent Interest Rate, net of investment expense, including price inflation	7.50 percent
Cost-of-living adjustment	4.00%, compounded annually, when a minimum COLA of 4.00% is in effect. 2.00%, compounded annually, when no minimum COLA is in effect (80% of price inflation).
Mortality	<p>Pre-retirement mortality rates were based on the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015.</p> <p>Post-retirement mortality rates were based on the RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%.</p> <p>Disabled mortality rates were based on the RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015.</p>

The actuarial assumptions used in the valuation are based on the results of the most recent actuarial experience study, which covered the five-year period ending June 30, 2015. The experience study report, performed by the prior actuary, is dated March 30, 2016.



Paragraph 42:

(a): Discount rate (SEIR). The discount rate used to measure the TPL at June 30, 2017 was 7.50%. The discount rate used to measure the TPL at the Prior Measurement Date was 7.65%.

(b): Projected cash flows. The projection of cash flows used to determine the discount rate assumed that plan contributions from members and the State of Missouri will be made at the contribution rates as summarized below:

- a. Employee contribution rate: 4.00% of salary for members hired on or after 1/1/2011; no contributions for members hired before 1/1/2011.
- b. Employer contribution rate: The actuarial required contribution rate is determined as of the Prior Measurement Date (June 30, 2015 for FYE June 30, 2017) and is subject to a minimum contribution rate of 58.45% until the plan is at least 80% funded.
- c. Administrative expenses in the prior year were projected forward with price inflation as an estimate for administrative expenses in the current and future years. The portion of expenses in future years allocated to the current members was based on the proportionate share of covered payroll in each year for the remainder of the existing members to the total covered payroll for all members.

Based on those assumptions, the System's FNP was projected to be available to make all projected future benefit payments of current System members. Therefore, the long-term expected rate of return on System investments of 7.50% was applied to all periods of projected benefit payments to determine the TPL.

The FNP projections are based on the System's financial status on the Measurement Date, the indicated set of methods and assumptions, and the requirements of GASB 67 and 68. As such, the FNP projections are not reflective of the cash flows and asset accumulations that would occur on an ongoing plan basis, reflecting the impact of future members. Therefore, the results of this test do not necessarily indicate whether or not the System will actually run out of money, the financial condition of the System, or the System's ability to make benefit payments in future years.

(c): Long-term rate of return. The long-term expected rate of return on pension plan investments is reviewed regularly as part of the experience study. The most recent experience analysis was performed and results provided on March 30, 2016 by the prior actuary, GRS Consultants. Generally, several factors are considered in evaluating the long-term rate of return assumption including long-term historical data, estimates inherent in current market data, and an analysis in which best-estimate ranges of expected future real rates of return (expected returns, net of investment expense and inflation), along with estimates of variability and correlations for each asset class, developed by the System's investment consultant. These ranges were combined to develop the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The capital market



assumptions developed by investment consultants are often intended for use over a 10-year investment horizon and are not always useful in setting the long-term rate of return for funding pension plans which covers a longer timeframe.

(d): Municipal bond rate. A municipal bond rate was not used in determining the discount rate. If it were required, the rate would be 3.56% on the Measurement Date.

(e): Periods of projected benefit payments. Projected future benefit payments for all current plan members were projected through 2116.

(f): Assumed asset allocation. The target asset allocation and best estimates of real rates of return for each major asset class will be supplied by the System.

(g): Sensitivity analysis. This paragraph requires disclosure of the sensitivity of the NPL to changes in the discount rate. The following presents the NPL of the System, calculated using the discount rate of 7.50 percent, as well as the System's NPL calculated using a discount rate that is 1-percentage-point lower (6.50 percent) or 1-percentage-point higher (8.50 percent) than the current rate.

	1% Decrease (6.50%)	Current Discount Rate (7.50%)	1% Increase (8.50%)
Net Pension Liability	\$484,552,509	\$426,782,984	\$377,354,336

Paragraph 43: The required information will be supplied by the System.



Paragraph 44 (a) – (c): This paragraph requires a schedule of changes in the NPL. The needed information is provided in the table below for reporting year ended June 30:

	Total Pension Liability (a)	Plan Fiduciary Net Position (b)	Net Pension Liability (a) – (b)
Balances at June 30, 2016	\$547,621,617	\$132,056,351	\$415,565,266
Changes for the year:			
Service Cost at end of year	12,945,567		12,945,567
Interest on TPL	40,617,091		40,617,091
Benefit term changes	0		0
Differences between expected and actual experience	(10,687,091)		(10,687,091)
Assumption changes	7,905,466		7,905,466
Employer contributions		34,246,826	(34,246,826)
Non-employer contributions		0	0
Employee contributions		786,745	(786,745)
Net investment income		4,680,131	(4,680,131)
Benefit payments, including member refunds	(33,984,725)	(33,984,725)	0
Administrative expenses		(150,387)	150,387
Other		0	0
Net changes	<u>16,796,308</u>	<u>5,578,590</u>	<u>11,217,718</u>
Balances at June 30, 2017	\$564,417,925	\$137,634,941	\$426,782,984

Paragraph 44(d): There is no special funding situation.



Paragraph 45:

(a): The Measurement Date of the NPL is June 30, 2017. The TPL as of June 30, 2017 was determined based on the annual actuarial valuation report prepared as of June 30, 2017.

(b): There is no special funding situation.

(c): There was one change in the actuarial assumptions that affected the measurement of the TPL since the Prior Measurement Date. This change was a decrease in the long-term rate of return from 7.65% to 7.50%.

(d): There were no changes in the benefit terms since the Prior Measurement Date.

(e): There were no benefit payments in the measurement period attributable to the purchase of allocated insurance contracts.

(f): The information will be supplied by the System and employer.

(g): Please see Section III for the development of the PE.

(h): Since certain expense items are recognized over closed periods each year, the deferred portions of these items must be tracked annually. If the amounts will increase PE they are labeled Deferred Outflows of Resources. If the amounts serve to reduce PE they are labeled Deferred Inflows of Resources. The recognition of these amounts is accomplished on a level dollar basis, with no interest included in the deferred amounts. Experience gains/losses and the impact of changes in actuarial assumptions or other inputs, if any, are recognized over the average expected remaining service life of the active and inactive System members at the beginning of the measurement period. The difference between projected and actual earnings is recognized over a fixed five-year period.



The following tables provide a summary of the amounts of the Deferred Outflows of Resources and Inflows of Resources as of the Measurement Date (June 30, 2017). Per GASB 68, reporting of the differences between projected and actual earnings should be on a net basis, with only one Deferred Outflow or Inflow. These are shown separately in the tables below to provide additional detail.

Deferred Outflows of Resources					
	June 30, 2016	Additions	Recognition	June 30, 2017	
Differences between expected and actual experience					
2014 Base	\$ 2,434,070	\$ 0	\$ 2,434,070	\$	0
2015 Base	2,321,087	0	1,391,290		929,797
2016 Base	0	0	0		0
2017 Base	<u>0</u>	<u>0</u>	<u>0</u>		<u>0</u>
Total	\$ 4,755,157	\$ 0	\$ 3,825,360	\$	929,797
Changes of assumptions					
2014 Base	\$ 0	\$ 0	\$ 0	\$	0
2015 Base	0	0	0		0
2016 Base	39,853,809	0	14,137,570		25,716,239
2017 Base	<u>0</u>	<u>7,905,466</u>	<u>2,068,952</u>		<u>5,836,514</u>
Total	\$ 39,853,809	\$ 7,905,466	\$ 16,206,522	\$	31,552,753
Differences between projected and actual earnings					
2014 Base	\$ 0	\$ 0	\$ 0	\$	0
2015 Base	8,576,950	0	2,858,984		5,717,966
2016 Base	8,389,679	0	2,097,420		6,292,259
2017 Base	<u>0</u>	<u>5,257,178</u>	<u>1,051,436</u>		<u>4,205,742</u>
Total	\$ 16,966,629	\$ 5,257,178	\$ 6,007,840	\$	16,215,967
Total	\$ 61,575,595	\$ 13,162,644	\$ 26,039,722	\$	48,698,517



Deferred Inflows of Resources					
	June 30, 2016	Additions	Recognition	June 30, 2017	
Differences between expected and actual experience					
2014 Base	\$ 0	\$ 0	\$ 0	\$	0
2015 Base	0	0	0		0
2016 Base	3,717,844	0	1,318,852		2,398,992
2017 Base	<u>0</u>	<u>10,687,091</u>	<u>2,796,936</u>		<u>7,890,155</u>
Total	\$ 3,717,844	\$ 10,687,091	\$ 4,115,788	\$	10,289,147
Changes of assumptions					
2014 Base	\$ 0	\$ 0	\$ 0	\$	0
2015 Base	0	0	0		0
2016 Base	0	0	0		0
2017 Base	<u>0</u>	<u>0</u>	<u>0</u>		<u>0</u>
Total	\$ 0	\$ 0	\$ 0	\$	0
Differences between projected and actual earnings					
2014 Base	\$ 4,998,630	\$ 0	\$ 2,499,314	\$	2,499,316
2015 Base	0	0	0		0
2016 Base	0	0	0		0
2017 Base	<u>0</u>	<u>0</u>	<u>0</u>		<u>0</u>
Total	\$ 4,998,630	\$ 0	\$ 2,499,314	\$	2,499,316
Total	\$ 8,716,474	\$ 10,687,091	\$ 6,615,102	\$	12,788,463



(i): Amounts reported as Deferred Outflows of Resources and Deferred Inflows of Resources related to pensions will be recognized in PE in future fiscal years as follows:

Year Ending June 30:	Deferred Outflows of Resources	Deferred Inflows of Resources	Net Deferred Outflows/(Inflows) of Resources
2018	\$23,144,159	\$6,615,104	\$16,529,055
2019	19,655,459	3,877,076	15,778,383
2020	4,847,465	2,296,283	2,551,182
2021	1,051,434	0	1,051,434
2022	0	0	0
Thereafter	0	0	0

(j): Based on information supplied by the System, the Missouri State Employees' Retirement System for Judges receives no revenue from non-employer contributing entities.



SECTION V – REQUIRED SUPPLEMENTARY INFORMATION

There are several tables of Required Supplementary Information (RSI) that need to be included in the System's financial statements:

Paragraphs 46(a) - (c): The required tables of schedules are provided in Appendix A.

Paragraph 47: Significant methods and assumptions used in calculating the Actuarially Determined Contributions, if any, should be presented as notes to the schedule required by paragraph 46(c). In addition, for each of the schedules required by paragraph 46, information should be presented about factors that significantly affect trends in the amounts reported.

Changes of benefit and funding terms: The following changes were made by the Missouri General Assembly and reflected in the valuation performed as of June 30 listed below:

None

Changes in actuarial assumptions and methods:

6/30/2017 valuation:

- The investment return assumption was lowered from 7.65% to 7.50%.

6/30/2016 valuation:

- The long-term rate of return was lowered from 8.00% to 7.65%.
- Post-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 healthy annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%.
- Pre-retirement mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA to the RP-2014 employee mortality table, projected from 2006 to 2026 with Scale MP-2015.
- The disabled mortality table was updated from the RP-2000 combined healthy mortality table, projected to 2016 with Scale AA and set forward 10 years to the RP-2014 disabled mortality table, projected from 2006 to 2026 with Scale MP-2015.
- Retirement rates were changed to better reflect actual experience of the System.
- Withdrawal rates were changed to better reflect actual experience of the System.
- The marriage assumption at retirement was increased from 70% to 80%.
- The marriage assumption for in-service deaths was increased from 70% to 80%.
- The asset smoothing period changed from an open 3-year period to an open 5-year period.



6/30/2014 valuation:

- For the 2014 valuation only, a one-time adjustment to the payroll growth from 3.00% to 14.38% was assumed for the year after the valuation date to reflect the average planned salary increase for 2015.
- The unfunded actuarial accrued liability amortization method was changed from a level percentage of payroll amortized over an open 30-year period to a level percentage of payroll amortized over a closed 30-year period beginning with the 6/30/2014 valuation.



Method and assumptions used in calculations of actuarially determined contributions.

The System is funded with contribution rates that are 4.00% of monthly salary for members hired on or after January 1, 2011 (0% for all other members) and an actuarially determined rate for the State of Missouri (subject to a minimum rate of 58.45% until the System is 80% funded on an actuarial basis). The Actuarially Determined Contributions in the *Schedule of Employer Contributions* are calculated as of the fiscal year two years prior to which contributions are reported.

The following actuarial methods and assumptions were used to determine the Actuarially Determined Contribution reported for the most recent Measurement Date, June 30, 2017 (based on the June 30, 2015 actuarial valuation):

Actuarial cost method	Entry Age Normal
Amortization method	Level percentage of payroll, closed
Remaining amortization period	29 years
Asset valuation method	Open 3-year smoothing based on actual market return and expected actuarial return
Price Inflation	2.50 percent
Payroll Growth	3.00 percent
Salary increases, including inflation	3.00 to 5.20 percent
Long-term Rate of Return, net of investment expense, including price inflation	8.00 percent
Cost-of-living adjustment	4.00%, compounded annually, when a minimum COLA of 4.00% is in effect. 2.00%, compounded annually, when no minimum COLA is in effect (80% of price inflation).
Asset valuation method	Open 3-year smoothing based on actual market return and expected actuarial return

Please see the information presented earlier in regard to Paragraph 47 for detailed information on the benefit changes and assumption changes that may have impacted the Actuarially Determined Contributions shown in the *Schedule of Employer Contributions*.



APPENDIX A

Exhibit A

GASB 68 Paragraphs 46(a) – (b) SCHEDULE OF CHANGES IN THE NET PENSION LIABILITY

Plan Year Ended June 30

	2017	2016	2015	2014
Total Pension Liability				
Service Cost	\$12,945,567	\$10,932,097	\$10,613,686	\$8,990,293
Interest	40,617,091	37,755,240	36,161,612	34,013,615
Benefit term changes	0	0	0	0
Differences between expected and actual experience*	(10,687,091)	(5,036,696)	5,103,664	13,360,614
Assumption changes	7,905,466	53,991,379	0	0
Benefit payments, including member refunds	<u>(33,984,725)</u>	<u>(32,989,714)</u>	<u>(31,245,906)</u>	<u>(29,406,625)</u>
Net change in Total Pension Liability	\$16,796,308	\$64,652,306	\$20,633,056	\$26,957,897
Total Pension Liability - beginning	\$547,621,617	\$482,969,311	\$462,336,255	\$435,378,358
Total Pension Liability - ending (a)	\$564,417,925	\$547,621,617	\$482,969,311	\$462,336,255
Plan Fiduciary Net Position				
Employer contributions	\$34,246,826	\$33,642,497	\$32,696,686	\$29,264,877
Employee contributions	786,745	661,206	488,193	294,810
Net investment income	4,680,131	28,082	(3,610,352)	21,394,750
Benefit payments, including member refunds	(33,984,725)	(32,989,714)	(31,245,906)	(29,406,625)
Administrative expenses	(150,387)	(136,983)	(123,015)	(105,693)
Other	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Net change in Plan Fiduciary Net Position	\$5,578,590	\$1,205,088	(\$1,794,394)	\$21,442,119
Plan Fiduciary Net Position – beginning	\$132,056,351	\$130,851,263	\$132,645,657	\$111,203,538
Plan Fiduciary Net Position - ending (b)	\$137,634,941	\$132,056,351	\$130,851,263	\$132,645,657
Net Pension Liability - ending (a) - (b)	\$426,782,984	\$415,565,266	\$352,118,048	\$329,690,598
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	24.39%	24.11%	27.09%	28.69%
Covered payroll	\$58,591,661	\$57,421,016	\$55,656,457	\$49,587,936
Employers' Net Pension Liability as a percentage of covered payroll	728.40%	723.72%	632.66%	664.86%

Note: Schedule is intended to show 10-year trend. Additional years will be reported as they become available.

* For 2017, includes (\$8,769,080) in transition/actuarial software changes.



Exhibit B
GASB 68 Paragraphs 46(c)
SCHEDULE OF EMPLOYER CONTRIBUTIONS
Fiscal Year Ended June 30

	2017	2016	2015	2014
Actuarially determined employer contribution	\$32,670,710	\$33,642,497	\$32,696,686	\$29,264,877
Actual employer contributions	<u>34,246,826</u>	<u>33,642,497</u>	<u>32,696,686</u>	<u>29,264,877</u>
Annual contribution deficiency (excess)	<u>(\$1,576,116)</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
Covered payroll	\$58,591,661	\$57,421,016	\$55,656,457	\$49,587,936
Actual contributions as a percentage of covered payroll	58.45%	58.59%	58.75%	59.02%

Note: Information prior to 2017 was produced by the prior actuary.



APPENDIX B

SUMMARY OF PLAN PROVISIONS

Age and Service Retirement

Eligibility for Unreduced Benefit (for Members Hired Before 1/1/2011)

The earliest of attaining:

- (1) At least 62 with 12 years of creditable service.
- (2) At least 60 with 15 years of creditable service.
- (3) At least 55 with 20 years of creditable service.

Eligibility for Unreduced Benefit (for Members Hired On or After 1/1/2011)

The earliest of attaining:

- (1) At least 67 with 12 years of creditable service.
- (2) At least 62 with 20 years of creditable service.

Benefit Amount

50% of compensation

Early Retirement

Eligibility for Reduced Benefit (for Members Hired Before 1/1/2011)

Age 60

Benefit Amount

- (1) If between 60 and 62, years of service divided by 15 multiplied by 50% of compensation.
- (2) If at least 62, years of service divided by 12 and multiplied by 50% of compensation.

Eligibility for Reduced Benefit (for Members Hired On or After 1/1/2011)

Age 62

Benefit Amount

- (1) If between 60 and 67, years of service divided by 20 multiplied by 50% of compensation.
- (2) If at least 67, years of service divided by 12 and multiplied by 50% of compensation.

Compensation used for Benefit Determination

The annual salary at date of termination of the highest position held.



Vested Deferred Benefits

Benefits for employees who terminate prior to eligibility for an immediate benefit are considered to be vested. Benefits commence once the individual qualifies for normal or early retirement based on age and service.

Death Benefits

Death Prior to Retirement

50% of the benefit the member would have been eligible to receive based on service to age 70 is payable to an eligible spouse or minor children.

Death After Retirement

50% of the benefit the retired member was receiving at the date of death to an eligible surviving spouse for members hired before January 1, 2011.

Disability Benefits

Disability benefits become payable at the time the member is eligible for normal retirement (50% of salary for remainder of term) and are computed based on the service that would have accrued if active employment had continued until normal retirement age, and member's compensation while an active employee.

Post-Retirement Benefit Adjustments

Benefits are increased to benefit recipients (including survivors) annually in accordance with the following formulas:

Increase in CPI	Formula 1 Benefit Increase	Formula 2 Benefit Increase
5.00% or less	4.00%	80% of CPI increase
5.01% - 6.24%	80% of CPI increase	80% of CPI increase
6.25% or more	5.00%	5.00%

Members first hired prior to August 28, 1997 receive COLAs based on Formula 1 until an aggregate increase of 65% is reached. At that point, subsequent COLAs based on Formula 2 are granted.

Members first hired on or after August 28, 1997 receive COLAs based solely on Formula 2.

Members hired prior to January 1, 2011 who work beyond the later of age 60 or the date when first eligible for age and service retirement will have their monthly benefit increased upon retirement. The percentage increase is equal to all COLAs for the years between (i) the later of age 60 or the date when first eligible for age and service retirement and (ii) date of actual retirement, not to exceed 65%.



Member Contributions

For members hired prior to 1/1/2011:	None
For members hired on or after 1/1/2011:	4.00% of salary, with interest credited at the 52-week Treasury bill rate.



APPENDIX C

STATEMENT OF ACTUARIAL ASSUMPTIONS

1. Long-term Rate of Return	7.50%, compounded annually, net of investment expenses. (7.65% in June 30, 2016 valuation)
2. Inflation	2.50% per year
3. Salary Increases	See items 3 under Demographic Assumptions
4. Payroll Growth	3.00% per year
5. Cost-of-Living Adjustment (COLA)	4.00% on a compounded basis when a minimum COLA of 4.00% is in effect. 2.00% on a compounded basis when no minimum COLA is in effect.
6. Interest on Member Contributions	1.50% per year

Demographic Assumptions

1. Mortality	The mortality assumption includes an appropriate level of conservatism that reflects expected future mortality improvement.
a. Post-retirement	RP-2014 Healthy Annuitant mortality table, projected from 2006 to 2026 with Scale MP-2015 and scaled by 98%
b. Pre-retirement	RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015
c. Long-term disability	RP-2014 Disabled mortality table, projected from 2006 to 2026 with Scale MP-2015



2. Retirement Assumption

Retirement Age	<u>Hired Before 1/1/2011</u>				<u>Hired On or After 1/1/2011</u>		
	Normal Retirement	Early Retirement			Retirement Age	Normal Retirement	
	Male	Female	Male	Female		Male	Female
55	20%	3%					
56	16%	3%					
57	13%	3%					
58	9%	3%					
59	5%	3%					
60	8%	8%					
61	5%	8%					
62	8%	8%	6%	3%	62	30%	35%
63	10%	8%	6%	3%	63	20%	20%
64	12%	8%	6%	3%	64	15%	20%
65	12%	15%	6%	3%	65	30%	50%
66	20%	15%	6%	3%	66	25%	25%
67	20%	15%	6%	3%	67	20%	25%
68	30%	15%	6%	3%	68	20%	25%
69	30%	15%	6%	3%	69	30%	50%
70	100%	100%	100%	100%	70	100%	100%

3. Termination From Active Employment

Sample Ages	Percent of Active Members Separating within the Next Year				Pay Increase Assumptions for an Individual Employee		
	Death*		Disability		Merit & Seniority	Base (Economy)	Increase Next Year
	Males	Females	Males	Females			
25	0.03 %	0.01 %	0.01 %	0.01 %	2.20 %	3.00 %	5.20 %
30	0.03	0.02	0.02	0.01	2.20	3.00	5.20
35	0.04	0.03	0.03	0.02	1.48	3.00	4.48
40	0.05	0.04	0.04	0.03	0.76	3.00	3.76
45	0.07	0.05	0.05	0.04	0.60	3.00	3.60
50	0.13	0.09	0.08	0.07	0.54	3.00	3.54
55	0.24	0.16	0.13	0.12	0.44	3.00	3.44
60	0.42	0.23	0.20	0.19	0.00	3.00	3.00
65	0.74	0.33	0.20	0.19	0.00	3.00	3.00
70	1.23	0.55	0.20	0.19	0.00	3.00	3.00

* The pre-retirement mortality table used was the RP-2014 Employee mortality table, projected from 2006 to 2026 with Scale MP-2015.



Service Index	Percent of Active Members Separating within the Next Year	
	Withdrawal	
	Males	Females
1	0.040 %	0.040 %
2	0.010	0.023
3	0.013	0.023
4	0.013	0.023
5	0.013	0.023
6-10	0.013	0.023
11-15	0.017	0.023
16+	0.010	0.010

Other Assumptions

- | | |
|--------------------------------|--|
| 1. Form of Payment | Hired before 1/1/2011 – 50% joint and survivor
Hired on or before 1/1/2011 – Straight life annuity |
| 2. Marital Status | |
| a. Percent married | 100% married |
| b. Spouse's age | Females assumed to be four years younger than males. |
| 3. Pay Increase Timing | Beginning of the fiscal year. |
| 4. Decrement Timing | Decrements of all types are assumed to occur mid-year. |
| 5. Eligibility Testing | Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur. |
| 6. Benefit Service | Exact fractional service is used to determine the amount of the benefit payable. |
| 7. Decrement Relativity | Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects. |
| 8. Decrement Operation | Disability and withdrawal do not operate during normal retirement eligibility. |
| 9. Other Liability Adjustments | None |
| 10. Incidence of Contributions | Contributions are assumed to be received continuously throughout the year based upon the |



computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.

11. Forfeitures

No vested member are assumed to take a refund of employee contributions.

12. Salary and Benefit Limits

For purposes of the valuation, no limits were applied to member compensation or benefits.

13. Commencement age for deferred vested benefit

Normal retirement age

Data Adjustments

Active and retired member data was reported as of May 31, 2017. It was brought forward to June 30, 2017 by adding one month of service for all active members and the June COLA for certain retired members. Financial information continues to be reported as of June 30. This procedure was instituted to provide sufficient time for the Board of Trustees to certify the appropriate contribution rate prior to the October 1 statutory deadline.

Active members reported with no annualized salary were assumed to receive the average active member pay.

TECHNICAL VALUATION PROCEDURES

Other Valuation Procedures

Salary increases are assumed to apply to annual amounts.

Decrement are assumed to occur mid-year, except that immediate retirement is assumed for those who are at or above the age at which retirement rates are 100%. Standard adjustments are made for multiple decrements.

No actuarial liability is included for participants who terminated without being vested prior to the valuation date, except those due a refund of contributions.